

# PATENT COOPERATION TREATY

TRANSLATION

From the  
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year) **25.11.2005**

Applicant's or agent's file reference  
**20051340**

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
**PCT/ES2005/070051**

International filing date (day/month/year)  
**25.04.2005**

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC  
**H01Q9/44**

Applicant  
**RADIACION Y MICROONDAS, S.A.**

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA/ES

Date of completion of this opinion

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/ES2005/070051

Box No. I

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:  
☒ the international application in the language in which it was filed  
☐ the translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rule 12.3(a) and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material  
☐ on paper  
☐ in electronic form
  - c. time of filing/furnishing  
☐ contained in the international application as filed  
☐ filed together with the international application in electronic form  
☐ furnished subsequently to this Authority for the purposes of search
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

International application No.  
PCT/ES2005/070051

Form PCT/ISA/237 (Box No. V) (April 2005)

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/ES2005/070051

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

rods on the base of the element that excites the cavity  
(claim 7).

It is possible to adjust the input impedance, without it being necessary to modify the cavity or the dipoles, simply by adjusting the size and the distance at which the metal plate is welded (claim 3). This distance for securing the metal plate is less than  $\lambda/2$  with respect to the rear wall of the cavity,  $\lambda$  being the wavelength of the central working bandwidth frequency (claim 2).

By giving the metal plate different geometrical shapes, it is possible to control and to adjust, in a simple manner, the contrapolar polarization level and decoupling between dipoles (claim 5).

A number of antennas like that of the invention may be grouped together to form an array structure. The array structure is produced from steel and subjected to an electrolytic bath, whilst the radome is produced from glass-fiber/polyester. The electrolytic bath is in copper and white brass (claims 12, 13 and 14).

By adjusting the profiles and the heights of the cavity's side walls and also the dimensions of the cavity, different radiation patterns can be formed, with different characteristics such as main beam width or level of principal to side lobe, for example (claim 15).

On the metal plate of one or more antennas such as those of the invention in an array of said antennas, it is

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possible to arrange a small bar or strip of metal whereby better reception of the waves received laterally can be achieved, the effect of incorrect adjustment of the polarization owing to the lateral arrival of the waves at the antenna being compensated for by means of the small bars and strips mentioned (claim 8).

By adjusting the distances at which the metal plates of the antennas of the array are positioned, it is possible partially to cancel out the reflections produced on the antenna's protective housing (claim 9).

By modifying the size, profiles of the side walls of the cavity and the height thereof, and also the size of the cavity and the height thereof, as well as the size of the cavity, it is possible to even further improve the decoupling between dipoles and contrapolar polarization level (claim 16).

Documents taken into consideration:

- D1 US 6747606 (2004.06.08)
- D2 EP 13772216 (2003.12.17)
- D3 US 5952983 (1999.09.14)
- D4 US 2003/0076269 (2003.04.24)

Document D1 describes an array of double polarization dipoles for use in mobile communications systems. The element that excites the cavities of the array is a structure formed by a base and a pair of dipoles, the arms of which are arranged as a V (column 2, line 19).

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Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

At the input of the dipole structure, no holes or other structures are required for insulating or achieving the connection of the supply cables to the dipoles. This is achieved directly (column 4, line 39).

There are separators between the arms (column 4, line 50).

The impedance of the dipole is achieved by means of adjusting the dipole structure (column 4, line 53). The structure of the cavity, the size, the height and profiles of its walls modify the electrical characteristics of the antenna and also the latter's radiation pattern (column 5, line 49).

Document D2 describes an antenna formed by a radiating element to whose end is connected a metal plate, connected to earth, whereby it is possible to adapt the input impedance of the antenna without the need to modify the structure of the rest of the antenna. By modifying the shape and distance of said metal plate, it is possible to adjust the input impedance.

Therefore, the technical features of claims 1 to 7 and 13 to 16 do not involve an inventive step, since documents D1 and D2 disclose all the technical features that define the invention being examined.

Document D3 describes an array of radiating elements with dual polarization. The radiating elements and the cavity, which is formed by an earth plane and walls, determine the characteristic impedance, the radiation pattern and

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

the radiation characteristics of the antenna.

The antenna may be made from brass, copper or aluminum  
(column 3, line 29).

The walls of the cavity affect the radiation  
characteristics of the antenna (column 5, line 38), and  
the parasitic elements may be established.

Document D4 describes an antenna formed by a monopole  
with a metallized plate connected to its end. The shape  
of and distance at which said metal plate is positioned  
make it possible to modify the input impedance and the  
working frequency without having to modify other  
structural elements of the antenna.

Therefore, the technical features of claims 1 to 7 and 13  
to 16 do not involve an inventive step, since documents  
D3 and D4 disclose all the technical features that define  
the invention being examined.

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| <input checked="" type="checkbox"/> | Box No. I    | Basis of the opinion   |
| <input type="checkbox"/>            | Box No. II   | Priority   |
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a. type of material



a sequence listing



table(s) related to the sequence listing

b. format of material



on paper



in electronic form

c. time of filing/furnishing



contained in the international application as filed



filed together with the international application in electronic form



furnished subsequently to this Authority for the purposes of search

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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
<b>1. Statement</b>			
Novelty (N)	Claims	1-16	YES
	Claims		NO
Inventive step (IS)	Claims	8-12	YES
	Claims	1-7, 13-16	NO
Industrial applicability (IA)	Claims	1-17	YES
	Claims		NO
<b>2. Citations and explanations:</b>			
<p>The present invention relates to a rear cavity antenna excited with one or more dipoles in a single piece, which is secured to the cavity. On the piece that excites the cavity there is a metalized plate, connected electrically to earth, thereby preventing the antenna from charging electrostatically (claim 1).</p> <p>The cavity is made from steel and subjected to an electrolytic bath, whilst the layer protecting the antenna is made from glass fiber with polyester (claim 10). The electrolytic bath is in copper and white brass (claim 11).</p> <p>The standard coaxial cable is connected directly to the input of the dipoles, without the need for intermediate transformers, cable portions with a different characteristic impedance or any modification to said cables in order to adjust the antenna input impedance (claim 4).</p> <p>The metal plate is secured to the element that excites the cavity by means of rods (claim 6). There are emergent bosses or nipples for accommodating the lower end of the</p>			

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